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Bezeichnung der Erfindung/Title of the invention/Titre de l'invention:
(Falls die Bezeichnung der Erfindung nicht angegeben ist, siehe Beschreibung.
If no title is shown please refer to the description.
Si aucun titre n'est indiqué se referer à la description.)

Defining combi-devices for a smart remote control

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Defining combi-devices for a smart remote control

FIELD OF THE INVENTION

The invention relates to a method of controlling combi-devices using a remote control. The invention further relates to a system for controlling combi-devices using a remote control. The invention further relates to a computer program product for carrying out

5   the above method.

BACKGROUND OF THE INVENTION

In some advanced remote controls like Intrigue's Harmony remote, a setup-procedure let's users setup all CE devices they have in their house. The Harmony remote will

10   be configured to work with those devices. Other remotes may also have such a setup. When a user selects the device-type he has (TV, VCR, DVD, Home Cinema, X-Box, PC, ...) he is able to choose from a (prioritized) list.

Nowadays, the range of different device-types is exploding. Combo-devices as TV+VCR, TV+DVD player, Home Cinema (DVD player+Amplifier+Tuner), PVR (tuner +

15   HDD, ..) are emerging fast. New home theatres may also include a VCR or DVD-recorder, ... So the definition about what features a certain device type (i.e. Home Theatre) actually provides is getting fuzzy.

This causes a problem in the setup of universal remote controls. Offering all these device types in a list makes the list too long, and it's getting very unclear for users what

20   device it actually is. A relatred problem ios the fact that different vendors use different names for the same combinations (eg amplifier, receiver, home theatre). Finally this causes maintenance problems for both the providers of universal control code databases and the providers of universal remote control products (software maintenance essentially).

25   ## OBJECT AND SUMMARY OF THE INVENTION

It is an object of the invention to provide an improved system and method of the type defined in the opening paragraph.

The invention is to scale down to a limited number of 'basic device-types'. These are well-known device-types with clear understanding of what it is (TV, VCR, DVD,

DVD-recorder, HDD-recorder, Amplifier, Tape, ...). Another category are the 'Combo device-types' that include combinations of functionality of the basic device-types: Home Cinema, TV+VCR combo, Receiver (Amp+Tuner), etc.

5 The system may offer some predefined combo-devices (like the ones mentioned), and the user may choose to define his own combo device. I.e. the user can tell the system that he has a 'Home Cinema' consisting of a DVD-player, VCR, Tuner, Super CD player and Amplifier.

By providing this information, the system now can achieve three things:

The system knows that for these three devices certain <u>IR codes will be shared</u>
10 (eg there will be only 1 power off command).

The system can <u>generate a user interface</u> by adding up the screens of the individual components. Optionally there may be some smart logic substracting those command buttons that are duplicate (such as power).

By knowing that certain devices physically belong in one device, the system
15 will know that they <u>share certain state variables</u>. This is useful in case the system has some advanced features, based on tracking the state of equipment. That state information is used to conditionally send commands or not (for eg depending on the power state of a device the power on command is sent or not).

20

Basically the core of the invention is the concept of having combo devices defined as a sum of their components. And to allow for user-definable combo-devices. Where a combo-device is one box that combines a set of basic features. The user can define his own combo-device by choosing a set of basic features or the system can propose a list of well-
25 known combo-devices.

When the user goes through a setup procedure for a smart remote control (maybe on the device, or on another device like a PC), the user needs to add all CE devices he has in his house/room.

For each CE device, the user can choose from 'basic device-types' (TV, VCR,
30 Amplifier, Tape, DVD-recorder, ...) or a 'combo device-type'.

When the setup procedure is finished, the system (smart remote control) knows what CE devices the user has in his home.

This information can be used for intelligent remote control devices. For instance, the smart RC needs to be able to know how a certain device needs to be turned on.

Knowing what kinds of functionalities are packed in one device, helps the system to understand what to switch on and off.

I.e. to record a DVD movie onto a VCR, requires this information. If there is a separate DVD-player and VCR recoreder, the user/system has to put both devices on, switch the VCR to the correct input and start the recording. If the user has one Home Cinema box with integrated DVD-payer and VCR, the user/system only has to turn that Home Cinema on, switch it-to the correct input and record.

Information about these combo devices may be put in a 'database' in the system. Such a database of all kinds of combo devices (including Brand, and IR-codes) may be built up that aid the user even more when setting this up.

The invention can be used in smart remote control systems (whether in 1 box or distributed over multiple devices) that use a universal database of control codes.

The system can be applied in both universal remote control software and universal control databases.

The system can be applied irrespective of where the configuration of the universal remote control is performed: wether it is embedded in a device, wether it is done using a PC or wether it is done from a remote location (web-server).

Further aspects of the invention will be disclosed hereinafter.

On devices like the Philips Pronto, it's already possible to make customized screens with RC-buttons per CE device in the home. Like all universal remote controls, it's possible to program the RC to send the right IR for the device (actual brand, devicetype, codeset) in a specific user's home.

On Pronto, there is a (set of) page(s) for each distinct device. Still, the user is already able to (on the PC with the ProntoEdit software) manually create custom pages with buttons that send IR to a multitude of CE devices.

A known remote has support for activity-based control. I.e. based on the activity 'Watch DVD' it will give the combined controls to control both the DVD and the TV the user watches on. This idea however is not part of this concept.

Another known remote has the concept of activities, but the user himself is forced to record a macro that may turn both the DVD and TV on.

This aspect of the invention solves the problem that on a universal remote (including Pronto) the user needs to switch to multiple pages to watch a DVD. I.e. first to go

to the TV page, to turn on the TV, than put the input of the TV to the DVD input, switch to the DVD pages, turn the DVD on, and press play. Also changing the volume of the TV, means switching from DVD to TV again. When pausing the DVD, switch to DVD again, ... and so forth.

This problem is already known to certain Pronto users. On the Pronto they are able to manually (on the PC using the ProntoEditor software) to create a new custom page and manually add the buttons that are needed in a scenario like 'Watch DVD'. But this solution again has it's disadvantage, that can be overcome by this invention. The learning curve to master ProntoEdit, and manually configure everything on the PC is very steep. Most users won't do this or find it too complex.

This invention solves this by providing a 'setup' process that automatically generates the combined pages.

A simple setup procudure (i.e. using a wizard), asks the user which devices he has in his house/room. Based on the results, the RC-devices automatically generates a set of 'combined pages', for devices that are related. A combined page offers convenient placement of buttons that relate to two or more physical CE devices. This prevents a user from switching between multiple pages to support a certain experience.

Increased convenience when using ((touchscreen) LCD) universal remotes is core.

This aspect of the invention can be separated into two parts:

The setup needed.

The usage of the Remote Control application with 'combined pages'.

During the initial setup phase, the user specifies what CE devices (TV, DVD, VCR, Amplifier, Streamium, ...) he has. Per device, the user has to specify what IR has to be send. This depends on Brand, Devicetype, etc.. information.

Than the links between the CE devices have to be defined. During setup, the system asks the user what devices are related to each other. This can be combinations of two or more devices. I.e. the TV and the DVD player can be one combination. Or the Cable box, VCR and TV can be anther combination in the case the VCR has to be turned on to be able to watch content from the Cable box on the TV.

In this setup-phase it's important to make sure the required IR-commands to change the state of the CE devices is correct: on/off, input selection for TVs, Amps, ...

The result of the setup is a set of 'combined screens', one for each relevant combination of two or more devices. In the example, on of the combined screen is the one for the DVD & TV. The UI may provide methods for navigation between the 'combined screens'. Optionally, there still can be dedicated screens per CE device the user has (separate page for TV, DVD, VCR, Tape, …).

This setup-procedure may be done on the RC itself or any other device in the system (TV, …) or even a PC (on the internet or running locally).

The daily usage of the Remote Control is controlling the CE equipment. Using a certain UI navigation scheme, the user is able to access all 'combined screens' (as well as any other screens).

A combined screen, shows the all relevant combination of IR-buttons that are important in the combined screen (for two or more devices).

Special attention is on the buttons that control the state & input of the CE devices: on/off, input selection, … . But also often-used buttons for the certain combination (volume, mute, next chapter, program up, ….).

The picture below shows such a combined screen for the combination of a TV & DVD:
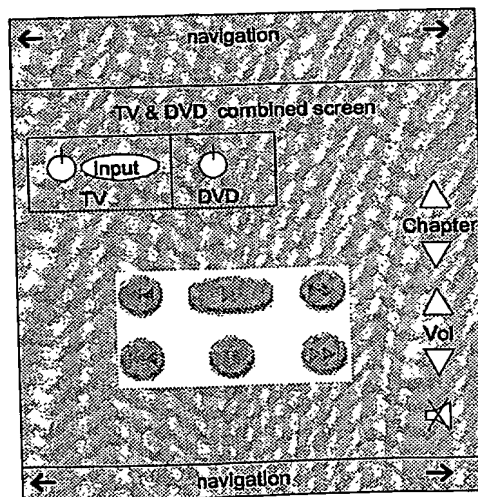
Picture description:

Shows an _example_ of how the combined screen for the TV & DVD combination may look.

In a certain area there are the 'state control' buttons. Like on/off, input select, etc.

There will be two or more devices in this screen.

The buttons may indicate the actual status of the referenced CE devices: show if the TV is on, or off.

5   Other buttons will trigger some action to one of the devices on the combined screen: Volume control will change the volume on the TV, the next chapter, play,... buttons will send IR to the DVD.

Note:

There may be separate buttons for on/off.

There may be direct buttons to go to input 1, input 2, S-Video,... depending on
10   the brand/type of CE equipment.

There may be build-in intelligence to control what buttons are needed on all different possibilities of a combined screen.

15   This invention may also work on non-touchscreen remote controls.

1)   An extension to this invention is to automatically switch the state on the devices on the combined screen if a (or any) button is pressed. I.e. on the 'TV & DVD'-combined screen, when the user presses directly the 'play'-button, the system has the intelligence to switch on the DVD and/or TV in case they were off, and select the right input
20   on the TV. In case that works, the 'state control' buttons are not necessarily needed anymore. This improvement may require a slightly improved setup-procure.

→ The Harmony remote control works like this for non-touchscreen remote control.

2)   In the case watching a DVD, depends on three devices: TV (video), DVD (content), Amplifier (audio), a combined screen has buttons for these three devices. I.e. 3
25   on/off buttons, select input for both the TV and the Amplifier. There might be separate volume buttons for both TV and Amp, or logic to turn of the TV audio, or keep it in sync with the Amplifier.

This invention is related to universal remote control devices, in particular to LCD/touchscreen RCs like Philips Pronto, iPronto, ...

30   Another aspect of the invention will now be discussed.

Current Prontos and other (traditional) kinds of universal remotes need to be setup before they can be used. Based on a certain Brand-Devicetype (devicetype i.e. TV, VCR, DVD, ...) combination, the user needs to select between 1 to 20 codesets. Basically, the user just needs to try to find the one that works best. Smarter remotes like Pronto may

offer a smart algorithm to try all codesets until one is found that actually works with the user's CE equipment.

The method described above, is very inconvenient for users. Since there is no way of knowing which codeset will actually work, and most users don't even understand

5   what a codeset is, it can be a very frustrating experience.

This invention describes a more automated method that can be used on smart (LCD-screen) remote controls, or more traditional universal remotes in combination with another device (like PC, STB, …).

When setting up the IR for a certain CE device, the system will ask the user to

10   take his original RC and press a certain button. The smart RC will then 'capture' the IR and match it to the codesets in his db. If there are multiple codesets in the DB that match, the system will ask to press another button, … etc. At the end there should be one codeset that best matches, and should work with the user's CE device.

Improvement: When the system asks to press another button, the system may

15   use an algorithm to determine the 'most discriminating code amongst the remaining codesets' and ask the user to press that button.

Other improvement: The system may have a precompiled list of discriminating buttons for a certain devicetype or brand/devicetype combination.

The system consists of:

20   a universal remote control device, with access to an IR-database (may be integrated, on other device, or online)

A means of interaction with the user. This can be an integrated display, display on other device (TV, STB, ..) or even PC.

A set of existing remote controls that already work with the CE equipment the

25   user is trying to configure his universal remote for.

Assume the user chooses to setup the IR for a certain CE device.

In more detail the method of finding the right codeset for a certain CE device works as follows:

Optional step: the system asks the user to specify some information about the

30   CE device he is trying to configure. I.e. brand, device-type, model-number, … . This information may be used to limit the search-space of codesets.

The system asks the user to take the existing RC for that CE device, and ask the user to press a certain button.

The user presses this button, and the system captures this IR-code.

The system tries to match the captured IR code to the (restricted) set of codesets.

In case multiple codesets still match, the system finds a (the most) discriminating IR-function among the set of matching codesets, and asks the user to press
5   that button.

If the button is not on the existing RC, the user has a means to indicate this, and the system will continue.

Until only a small number (preferable 1) codesets are left, steps 3-5 are repeated. If 0 codesets match, the algorithms stops unsuccessfully. If 2 or more codesets still
10   match because they are very similar or no IR-functions can be found using the user's existing RC, the system can 1) pick any of them, 2) ask the user to pick one, or 3) offer the option to scan or try the remaining codesets.

The universal RC is configured for the selected user's CE device.

There is no guarantee of success: there might be no codeset in the db that
15   matches, or multiple codesets that match, or the user is asked to press a button he doesn't have.

Fallback means of setting up the universal remote need to be available in case no codesets match or the result is unusable. (i.e. learning each code separately). Improvement: in case in step 6 the algorithm stops unsuccessfully, the system may ask the
20   user to learn all codes.

This aspect of the invention describes a method to setup a universal remote control (with a means to interact with a user, integrated or though another device like embedded device, PC, Internet).

Another aspect of the invention will now be discussed.
25   This aspect relates to a method to test and learn control codes on a universal remote control. It is a user-friendly method to allow configuration of a universal remote control by showing user visual feedback on the configuration state of individual commands. The same user interface allows at the same time to try commands and correct them in case they are faulty. This aspect of the invention can be applied in universal remote controls; with
30   LCD and touchscreen (pronto, iPronto,..)

Problems of the prior art: Universal remote controls are not easy to configure:

Universal infrared databases have limitations: not all functions may be present. This means a user may need to learn additional codes. However this will require the user to

try out the codes first and enter some learn mode – all non-obvious user interactions in setup menus.

Learning is cumbersome: it takes considerable time to learn all individual functions. It is alo hard to keep track for a user which codes have been learned and which

5   ones not. Sometimes the learn process is automated by prompting the user for commands one by one. This approach has the disadvantage that the user is forced to learn all codes – he can interrupt the process but can not judge for himself what the consequences may be. Sometimes the processes are combined, but it is either difficult

The solution provided by this aspect of the invention: Grey-Blue-Green

10   (GBG) user interface screen concept for trying / configuring a universal remote control:

Grey buttons = not configured

Blue buttons = configured, but not tested and confirmed to work

Green buttons = configured and confirmed to work OK by user

Principle:

15   First ask he user to configure using the infrared database. This may or may not succeed.

After that, show all functions for a certain device type in correct color code. In case a code set from the database was used: most will be blue with some greys (=holes in the database).

20   In case no database code set was selected by the user, all will be grey initially. Then let the user press buttons:

if configured (=blue) send the code and ask if it was ok

if ok: button becomes green

if not ok: button becomes grey

25   if not configured (=grey) then immediately prompt the user to learn;

make the button blue after a successful learn operation

if learning fails, the button remains grey

if green: simply send the code + possibly give the option to re-configure / learn the command.

30   At any point in time, the user has the possibility to end the process.

Depending on the nature and amount of codes that are left in a certain unconfigured or untested state, the user will be confronted with different types of warnings. In some cases it may not be allowed to exit yet.

When the user experiences problems during the normal use of his remote control, he still has the option to go back to setup. At that time he will again be presented with the color codes – helping him to detect potential problem sources.

Advantages of this aspect of the invention:

User can try as much as he wants; if he has good experience with the built-in database; or is interested in only a few commands he can limit the configuration time. In case he is an advanced user or when he does-not trust the quality level of the built-in database at all, he still has the possibility to try and configure each button individually.

The color codes give immediate visual feedback on what states the buttons are in.

User is immediately rewarded by small successes in an otherwise cumbersome configuration process by integrating the try and configure possibilities.

Another aspect of the invention will now be discussed.

Complex devices (like iPronto) need to be set-up at some point. When people buy it and take it home, they just want to start playing with it... not setting it up.

Therefore, it is proposed to set it up during/before the sale of the product. During the sale, people have to configure what parts they want in the PC, and can choose extras (hd, memory, ...).

For a device like iPronto, people could do part of the set-up (what TV, VCR, Satellite, ... do I have) while they are ordering it. This could apply doing it on-line or in a store.

Before shipping (on-line) or giving it, the right installation will be put on the device. So when the user receives it, it's already set-up for him.

Alternatively, the configuration could be stored on some (RF-id) card (MyFare, Near Field Communication), so people can copy the actual configuration on the device very easily.

The set-up may or may not be done in the form of a wizard.

Another aspect of the invention will now be discussed.

Problem of the prior art: AV devices all use different IR protocols (e.g. Philips protocols RC5, RC6,..), and also have different functions. (e.g. Philips DVD may have a special feature with a dedicated remote control command compared to a Sony DVD).

The main reason for the first diversity is interoperability: devices should not respond to IR control codes not intended for them. Since most IR protocols are one way and do not require user set-up, they do not include any addressing capabilities.

The latter diversity is a more fundamental one in the sense that is a result of the need for AV manufacturers to differentiate from their competition.

This has always made it difficult when users want to configure a universal remote control in order to replace one or multiple remote control units that came bundled with the AV equipment.

The only answer to the problem is to have an extensive database with variable function lists per device model number and the corresponding control codes.

Problem for users is to find their equipment in this database. They typically have to search through long lists per brand in a user manual, then write down a number and configure their remote control. Today's state of the art implementation uses an online database where users can select by device type, manufacturer and model name. The drawback of course is that users have to know the model number of their equipment which may be non-obvious (on a label at the back or bottom, may be different / confusing: various type numbers are on front plate, label, packaging etc).

Note: an additional problem with this type of database is that it inevitably grows extremely large and therefore can not easily be built into a product. Therefore universal remote control vendors typically take the greatest common denominator both for brands (e.g. only codes used by DVDs that make out 80% of the market) and for functions of a same device type (e.g. all DVDs have same function list). This results in lists per brand iso per model number, with the result that different possibilities are left open, and the user may have to try multiple codes before he found the good one. In this case lists are also typically printed in an IFU and the user has to look-up numbers and enter them into his remote control.

Today a lot of AV vendors want to solve interoperability problems by making networked devices. UpnP will become a standard for in home networked devices. See Philips Connected Planet, Digital Home Working Group and related.

As with IR control codes, UPnP will not be able to standardize everything. Indeed the current versions of the UPnP standard v1.0 and in particular its AV working group does not standardize a lot of control commands, nor does it make the implementation of these commands mandatory. The result will be that a lot of vendors will only implement the mandatory parts of the standard – and will not offer all the functions that are available on the bundled remote control over the network interface. If they do make the functions available over the network interface, they will use their own definition for them as they are not standardized by UPnP (vendor-specific commands).

In addition, even when vendors would do make these functions available over the networked interface, they will keep on bundling low cost remote controls with their products – as they can not expect their customer to own a networked controller.

Finally, the user may decide that in the end, direct control through IR or RF, remains the most suited method for controlling his equipment – as the networked equivalent may not offer the same response times (inherent to the used technology).

This invention describes a method to easily configure a networked remote controller in order to control a new networked AV device that the user has added into his home.

Elements of the invention:

Networked Universal Remote controller :

Capable of controlling devices in a legacy way (RF or IR – through local transmit circuitry or through repeaters or bridges).

Device is also networked (probably wireless using WiFi standard but may be other) and hence capable of detecting, communicating with and controlling of networked devices adhering to same interconnectivity standard (e.g. UPnP).

Has some programmable memory inside to store control code information about the AV devices in the house that it has to control.

Universal database of control codes (legacy: IR, RF or networked: UPnP vendor specifics); organized per manufacturer name and model number – allowing easy lookup based on device descriptors obtained by using the UPnP device discovery mechanism. Database may reside on a networked device in the home (e.g. PC or other) or on the internet. Database must be accessible for the remote control device.

Example Scenario:

User buys a new UPnP enabled DVD player, type "XYZ" of brand "Philips". User installs his DVD into his home network.

User also owns a networked remote controller. This remote controller detects the new DVD player, using UPnP's device discovery mechanism, and learns that it is a "Philips" "XYZ".

Refer to "UPnP Device Architecture 1.0" – chapter 2.1 "Description: Device description"; page 26

Required (=mandatory) fields contained in the device description are:

Manufacturer (string < 64 characters)

Model Name (sting < 32 characters)

With this information the remote controller connects to the database (online internet service or locally in house on STB, PC or other) to lookup the new AV device. The service returns a list of functions and corresponding control codes to the networked remote controller.

5   The remote controller installs the new device (possibly asking user confirmation), as a result all the control codes are now available to the user without having made any set-up.

The online database may be extended to provide graphical user interface representation in case the controller is a LCD touchscreen device. This way the original

10   remote controls key layout may be approximated as closely as possible.

Main benefit of this aspect of the invention is the fact that no user interaction is required to set-up the universal remote control (no lookup in IFUs, no search in long lists, no need to know the manufacturer or model name, no need to enter special set-up mode or whatsoever).

15   In addition this invention is essential to deliver the Connected Planet experience as is advocated by Philips CE. First target product is supposed to become the dashboard for the connected home.

Possible Embodiements are:

Networked Universal remote control (handheld, probably LCD touchscreen)

20   combined with UpnP control point.

Examples: Pronto, iPronto, WiFi enabled PDA with remnote control software,...

Network control node with IR capabilities. Home server solution for home control that centrally monitors and controls a hole house and that provides interfaces to

25   various low coat controllers of all kinds (eg simple 2 way IR or RF remote controls with or without LCD).

Some of the features indicated in the drawings are typically implemented in software, and as such represent software entities, such as software modules or objects.

While the invention has been described in connection with preferred

30   embodiments, it will be understood that modifications thereof within the principles outlined above will be evident to those skilled in the art, and thus the invention is not limited to the preferred embodiments but is intended to encompass such modifications. The invention resides in each and every novel characteristic feature and each and every combination of characteristic features. Reference numerals in the claims do not limit their protective scope.

Use of the verb "to comprise" and its conjugations does not exclude the presence of elements other than those stated in the claims. Use of the article "a" or "an" preceding an element does not exclude the presence of a plurality of such elements. 'Means', as will be apparent to a person skilled in the art, are meant to include any hard-ware (such as separate or integrated

5   circuits or electronic elements) or soft-ware (such as programs or parts of programs) which perform in operation or are designed to perform a specified function, be it solely or in conjunction with other functions, be it in isolation or in co-operation with other elements.

CLAIMS:

1.   A system for controlling combi-devices using a remote control in accordance with the above description and drawings.

2.   A method for controlling combi-devices using a remote control in accordance
5   with the above description and drawings.

3.   A computer program product enabling a programmable device when executing said computer program product to function as a system as defined in claim 1.

ABSTRACT:

Nowadays, a plethora of new CE devices that combine features of existing devices are appearing on the market. A TV + VCR combination, TV+DVD, a home theatre is a DVD player+Amplifiery+Tuner, many more new combinations will follow. In smart universal remote controls, like Pronto, it is becoming more difficult to offer a dedicated page

5   for all these new devices that mix certain features that used to be packaged in different products. This invention is about a method where a user is able to define his own combi device based on the basic functionality. I.e. he can create his own special home theatre by choosing that that device has DVD player, VCR, Amplifier & Tuner functionality packed in one device. It also still is vital to know that the new combi-device is still one box, since it

10   will have one button to turn on/off, do settings etc.